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PSYCHE

Vol. 63 March, 1956 No. 1

AUSTRALIAN CARABID BEETLES III. NOTES ON THE AGONINI[1]

By P. J. Darlington, Jr.

Museum of Comparative Zoology, Cambridge, Mass.

One of the interesting things in the geography of carabid beetles is that certain dominant groups of them have complementary distributions. For example, among small, ground-living but non-fossorial Carabidae, the great genus *Tachys* is dominant in the tropics but diminishes northward and southward; and it is largely replaced in the north-temperate zone and to some extent in some south-temperate areas by another great, related genus, *Bembidion*, which is very poorly represented in the tropics (*cf.* Darlington, Coleopterists' Bulletin Vol. 7, No. 2, 1953, pp. 12-16).

Two other tribes of larger Carabidae which have somewhat complementary distributions are the Pterostichini and Agonini. These tribes are only partly and very complexly complementary. Both are in fact cosmopolitan, but unevenly so. In some places, they occur in nearly equal numbers; in other places, Pterostichini are overwhelmingly dominant; and in others, Agonini are so.

These tribes tend to be complementary within the Australian region. In Australia itself and Tasmania Pterostichini are dominant, with more than 350 known species against only about 20 species of Agonini in the same area. But in New Guinea Agonini are dominant, with 107 known full species and 14 additional geographical subspecies

[1]Published with a grant from the Museum of Comparative Zoology at Harvard College.

(Darlington, Bull. Mus. Comp. Zool. Vol. 107, No. 3, 1952, pp. 89-252, pls.) against only about 20-odd species of Pterostichini (in material assembled for study but not yet formally studied).

One reason for the number of Agonini in New Guinea is that species of this tribe have multiplied on the mountains there, in forest at middle and high altitudes. Some of them occur even in the high grasslands above the forest line, at 11,000 feet or higher, where the climate is colder than it is in much of Australia. In Australia, however, Pterostichini, not Agonini, have multiplied on the mountains. Why this should be so is not immediately apparent. The Australian mountains are lower, but this does not account for the difference. On the Atherton Tableland and elsewhere in tropical Queensland in northeastern Australia, at altitudes of 2,000 or 3,000 feet, are big tracts of full-scale rainforest (called "scrub" in Australia) entirely comparable to the rainforests of New Guinea and containing some of the same species of trees. This kind of forest in New Guinea is inhabited by many Agonini and few Pterostichini; but in Australia, by few Agonini and many Pterostichini, most of the latter belonging to Australian genera which do not reach New Guinea at all. I have collected extensively in both the Australian and New Guinean rainforests, and I can testify from my own experience that the pterostichine-agonine faunas of the two places are unexpectedly and profoundly different — in spite of the fact that they share some identical species!

This difference can hardly be accounted for in simple ecological terms but is probably due to a complex combination of ecological, historical, and geographical factors. Over the world as a whole, there is a tendency for Agonini to be better represented in the tropics; Pterostichini, in the temperate zones; although this zonal complementarity is not strongly defined. Also it is probable that the Agonini are more recent in origin than the Pterostichini and that they have dispersed more recently, although the dispersal of each group has been very complex, and although even the Agonini dispersed long enough ago to have reached all

parts of the world and to have differentiated to some extent in different regions. I base this guess, of the more recent rise and dispersal of Agonini, chiefly on the lesser diversity of this tribe as compared with the Pterostichini. If all this is correct, it may be guessed that Pterostichini are dominant in Australia partly because Australia is more temperate than tropical in climate, and partly because the Pterostichini reached Australia before Agonini did; and it may be guessed that Agonini are dominant in New Guinea partly because the climate there is fully tropical, and partly because the carabid fauna of New Guinea is more recent in its origins than that of Australia. Add to this that the mountain carabid faunas of Australia and New Guinea have been derived independently, each from the lowland fauna adjacent to it, and not by dispersal along a connecting mountain chain, and we have an adequate and probably correct explanation of the unexpected difference in composition of the carabid faunas in the mountain rainforests of Australia and New Guinea.

Whether or not this explanation is correct, the situation among Carabidae suggests that, although Australia and New Guinea were connected by land at times in the Pleistocene (perhaps as recently as ten thousand years ago) and although some species crossed the connection, rainforest and mountain habitats were not fully continuous and whole faunas were not exchanged.

Sloane (Proc. Linn. Soc. N. S. W., Vol. 35, 1910, pp. 453-458) revised the Australian Agonini ("Sphodrini") known to him, recognizing 4 genera and 10 species not including *Homothes,* which he transferred to this tribe ("Anchomenini") in 1920 (Proc. Linn. Soc. N. S. W., Vol. 45, p. 164). However, some of his generic assignments, although correct according to the usage of his time, are now known to be wrong and misleading. I therefore offer the following new key to the Australian genera of Agonini (Sphodrini, Anchomenini). This key is still preliminary in some ways, but it puts the Australian forms in line with the New Guinean ones and disposes of the most misleading assignments.

The following key applies only to Australian species of

the genera in question. In the case of genera represented in Australia by single species, the species are characterized and named in the key. A comparable key to New Guinean Agonini is given in my paper cited above, pages 114-116.

Preliminary key to Australian genera of Agonini

1. Tarsi sparsely pubescent above; tarsal claws serrate on inner edge in basal half; (relatively large, c. 13-15 mm., dull black; introduced) .... *Laemostenus complanatus* Dej.
— Tarsi not pubescent above; claws not serrate 2
2. Tarsal claws each with an acute tooth on inner edge at base; (winged, brown, rather slender, prothorax suboval) ..... *Dicranoncus queenslandicus* (Sl.)
— Tarsal claws not toothed 3
3. Wings full *and* all normal setae of head and pronotum present 4
— Wings vestigial *and/or* one or more pairs of supraocular or lateral prothoracic setae absent 7
4. Sole of hind tarsus with a single, regular row of bristles on each side, with middle of sole bare; (slightly aeneous, *Agonum*-like) ..... *Lorostemma cooki* (Sl.)
— Bristles of hind-tarsal sole not as above 5
5. Brown, bronzed, or black; last hind-tarsal segment without accessory setae at sides below; elytra (in Australian species) not spined ..... *Notagonum*
— Purple (or blue), at least on elytra 6
6. Last hind-tarsal segment with accessory setae; elytra not spined; (prothorax narrow; elytra wide, purple) ..... *Colpodes porphyriacus* (Sl.)
— Last hind-tarsal segment without accessory setae; elytra spined at apex about opposite second intervals; (prothorax rather wide; color purple or bluish-purple) ..... *Violagonum* (n. gen.) *violaceum* (Chd.)
7. Wings full; humeri normal; (depressed; dull brown or black, often margined or finely speckled with pale) ..... *Homothes*
— Wings vestigial; humeri dentate; (convex; shining black) ..... *Odontagonum* (n. gen.) *nigrum* n. sp.

List of genera

Laemostenus (or *Laemosthenes*) is a Palearctic genus. *L. complanatus* Dej. is native to the sub-desert regions of North Africa. It has been introduced around the Mediterranean, on several Atlantic islands, in western North America, southern South America, and parts of Australia and Tasmania, etc.

Dicranoncus is a mainly Oriental genus. *D. queenslandicus* (Sl.) extends from India and the Philippines to North Queensland. In the Philippines (on Luzon) I found it living in clumps of tall grass in open country.

Lorostemma is an Oriental-Australian genus. *L. cooki* (Sl.) occurs from North Queensland south at least to Brisbane, where I took a series in flood debris in Oct.-Nov., 1943. It resembles *L. informalis* Darl. of New Guinea, but has a smaller prothorax with narrower margins. I have not made a more detailed comparison.

Notagonum is a genus of convenience, proposed for a number of relatively unspecialized New Guinean species which resemble the northern *Agonum* but do not really belong to it. I tentatively assign to *Notagonum* about 8 Australian species. Most of them have heretofore been listed as *Agonum, Platynus, Anchomenus,* or *Europhilus,* but these genera are all primarily northern and do not occur in the Australian Region. I shall not discuss these species in detail, except (below) to record one of them from Australia for the first time and to describe another as new.

Colpodes, as used here, is another genus of convenience not sharply separable from *Notagonum,* but containing usually more specialized, larger, often more brightly colored, often arboreal rather than terrestrial species. The only Australian species here assigned to *Colpodes* is *porphyriacus* (Sl.), which is known to me only by description. Of two other *"Colpodes"* listed by Sloane (1910), one (*lafertei* Mont.) is here tentatively assigned to *Notagonum,* and the other (*violaceus* Chd.) is placed in a new genus (below).

Violagonum is a new, monotypic genus proposed for *Colpodes violaceus* Chd. of New Guinea etc. and North Queensland.

Homothes is a primarily Australian genus, with half a dozen or more species in Australia and Tasmania. The genus is now known to have an endemic species also in Java and Luzon (Louwerens, in Treubia, Vol. 21, 1952, pp. 215-217).

[*Aeolodermus emarginatus* (Chd.), related to *Homothes* and described as from Victoria, is probably not Australian. It occurs from the Malay Peninsula to Celebes and the Philippines.]

Odontagonum is a new, monotypic genus based on a new species from North Queensland.

This list of genera shows that the native Agonini of Australia, heretofore thought to include geographically isolated representatives of several north-temperate genera, actually consist of the following:

Two chiefly Oriental genera which extend to north-eastern Australia: *Dicranoncus* is represented in Australia by a widely distributed Indo-Australian species; *Lorostemma,* by a slightly defined endemic species.

One mainly New Guinean genus and species, *Violagonum violaceum,* which extends to North Queensland without differentiation.

Two tentative genera of convenience, *Notagonum* and *Colpodes,* with about 9, mostly relatively unspecialized Australian species. One of these species, *Notagonum dentellum,* is mainly New Guinean; 1, *Notagonum lafertei,* shared with New Caledonia; and 1, *Notagonum submetallicum,* shared with New Zealand.

One genus, *Homothes,* which is chiefly Australian but represented in Java etc. by an endemic species.

And one probably autochthonous (but not necessarily very old), flightless genus and species, *Odontagonum nigrum,* confined to North Queensland.

The general nature of this fauna is consistent with the Agonini being relatively recent in Australia, and having accumulated there by successive arrivals from (or exchanges with) the Orient and New Guinea.

New records and descriptions

Notagonum dentellum Darl.

Darlington 1952, Bull. Mus. Comp. Zool. Vol. 107, 147.

This species, which is widely distributed in New Guinea, occurs also in North Queensland. I took two specimens of it at Millaa Millaa, on the Atherton Tableland, in April, 1932.

Notagonum nigrellum n. sp.

With characters of genus as defined in my paper on New Guinean Agonini, pages 127-129. Form of rather slender *Agonum;* black, appendages dark, margins of prothorax and elytra not pale; upper surface moderately shining, not iridescent, not punctate; microsculpture isodiametric on head, slightly transverse on pronotum and elytra. *Head* .77 and .77 (in ♂ ♀ measured) width prothorax; eyes large, moderately prominent; posterior supraocular setae about between posterior edges of eyes. *Prothorax*: width/length 1.29 and 1.29 (in ♂ ♀ measured); base/apex 1.32 and 1.25; sides rather broadly arcuate, sometimes subangulate at anterior marginal setae, converging and nearly straight or slightly sinuate before posterior angles; latter obtuse, usually slightly blunted; lateral margins rather narrow; basal foveae rather shallow, not or vaguely punctuate; anterior marginal line entire or nearly so, posterior one vague at middle. *Elytra* moderately wide; humeri rounded, sides behind humeri nearly straight and slightly diverging, then increasingly arcuate to moderate subapical sinuations; apices rounded or slightly denticulate (variable) at sutural angles; striae well impressed, not or faintly punctulate; intervals moderately convex, outer ones not much modified toward apex, 3rd with 3 normally placed punctures. Lower surface virtually impunctate; abdomen not pubescent. Fourth hindtarsal segment rather deeply emarginate but not strongly lobed. Length, about 8-9; width, 2.9-3.4 mm.

Holotype ♂ (M. C. Z. Type No. 29,461) and 22 paratypes all from Mt. Kosciusco, 5,000-7,000 ft. altitude, Dec. 1931, taken by myself probably (if my memory is correct) beside brooks.

This new species is probably related to *Notagonum* (*"Anchomenus"*) *marginellus* (Er.), but differs from it and from other related species in being entirely black and in having narrower prothoracic margins.

Violagonum n. gen.

Broad *Agonum*-like in form; color (in single known species) purple or purplish-blue. *Head* rather short (not elongate as in *Colpodes*); mentum toothed; mouth parts and antennae normal; both pairs supraocular setae present. *Prothorax* rather wide, with usual 2 pairs lateral pronotal setae. *Elytra* each with a spine at apex about opposite 2nd interval; striae normal; intervals normal except 9th narrowed apically (above subapical sinuations); 3rd normally 3-punctate. Inner wings full. Legs and tarsi normally agonine; tibiae not sulcate on outer edges; hind tarsi sulcate on each side above, with setae not forming single regular rows on each side below; 4th hind-tarsal segment lobed, outer lobe much longer than inner; 5th hind-tarsal segment without obvious accessory setae; claws simple. External sexual characters normal for tribe. Genotype: *Colpodes violaceus* Chd.

Although the species for which this new genus is proposed was, as a matter of convenience, left in *Colpodes* in my paper on New Guinean Agonini, it is not a true *Colpodes*. The short head particularly distinguishes it. The position of the elytral spines distinguishes it from the few species of *Notagonum* that have spines: in *Notagonum*, the spines (when present) are about opposite the ends of the 3rd elytral intervals. The lobes of the 4th hind-tarsal segment are longer than in most *Notagonum*. And the general form and color of *Violagonum* are distinctive, though not themselves of generic value.

Odontagonum n. gen.

Genus proposed for one medium-sized, flightless, convex *Agonum*-like species with two characters which, so far as I know, are unique among Agonini: antennae pubescent from the middle of the 3rd (not 4th) segments, and humeri toothed. Since the genus is based on one species, other generic and specific characters are all combined in

the following specific description. Genotype: *Odontagonum nigrum* n. sp., below.

Odontagonum nigrum n. sp.

Form of a broad, very convex *Agonum;* black, moderately shining, not iridescent, legs brownish black, antennae and mouth parts brown; upper surface impunctate except for fixed setigerous punctures; microsculpture light but normal, approximately isodiametric on head, transverse on pronotum, more transverse and oblique on elytral disk. *Head* rather elongate, only .57 and .59 width prothorax (in ♂ ♀ measured); eyes much less prominent than in typical *Agonum* but not much reduced otherwise; genae rather short, oblique, slightly arcuate; anterior supraocular setae absent, posterior ones present, about between posterior edges of eyes; antennae rather short (in tribe), normal except pubescent from middle of 3rd (not 4th) segments; mandibles, maxillae, and maxillary palpi all longer and more slender than usual in tribe; labial palpi shorter and stouter; mentum with triangular tooth; neck constriction weak; frontal sulci rather deep, linear, curved; clypeal suture distinct. *Prothorax* rather large, more narrowed in front than behind; width/length 1.18 and 1.11 (in ♂ ♀ measured); base/apex 1.3+; sides arcuate (not strongly) for most of length, less so or straight toward base; basal angles rather narrowly rounded; anterior angles slightly produced, rather narrowly rounded; lateral margins wide posteriorly, narrowed anteriorly, rather strongly reflexed, each with seta about 1/3 from apex but none at base; disk convex; basal foveae moderate, not sharply defined, not punctate; middle line well impressed from extreme base nearly to apex; transverse impressions less defined; base not or vaguely margined; apical marginal line distinct at sides, vague at middle. *Elytra* 1.32 and 1.31 width prothorax (in ♂ ♀ measured), convex; basal margin strong and entire; humeri dentate; sides arcuate (only slightly so at middle), with moderate subapical sinuations; apices bluntly subacute but not produced; lateral margins rather wide, forming slightly convex 10th intervals; sutural striae absent; other striae entire, deep, impunctate; intervals

convex, 7th subcostate in about anterior 1/2 of length, outer ones not much modified toward apex, 3rd with 1 setigerous puncture, near middle of length. Inner wings evidently vestigial; metepisterna scarcely longer than wide. Lower surface impunctate; abdomen not pubescent. Tibiae not sulcate on outer edges; hind tarsi slender, not distinctly grooved above; 4th hind-tarsal segment simply emarginate; 5th segment with 2 or 3 accessory setae each side below. External sexual characters normal; ♂ front tarsi more widely dilated than usual in tribe. Length about 11.0-11.5; width about 4.0-4.3 mm.

Holotype (M. C. Z. Type No. 29,462) ♂ from Millaa Millaa, Atherton Tableland, North Queensland, 2,500 ft. altitude. Two (♂ ♀) paratypes from Lake Barrine, Atherton Tableland, 2,300 ft. All specimens taken by myself in "scrub" (rainforest), in April, 1932.

SYMBRENTHIA SILANA DE NICEVILLE, A GOOD SPECIES (LEPIDOPTERA: NYMPHALIDAE)

By Nicholas W. Gillham

Biological Laboratories, Harvard University

While revising the Nymphalid tribe *Vanessini* I have had occasion to make a number of genitalic preparations from males and females of most of the species belonging to the genus *Symbrenthia*[1]. A study of these preparations has revealed that *Symbrenthia silana* de Niceville is a distinct species, and not a subspecies of *Symbrenthia niphanda* Moore as Fruhstorfer[2] maintains. The males of both species have very distinct genitalia and can also be told apart by several minute differences in the external facies. Females of *silana* were not available for study in the material at hand so the following diagnosis is applicable to the males of the two species only.

Symbrenthia niphanda Moore

Figs. 1-2

Symbrenthia niphanda Moore, 1872. Proc. Zool. Soc. London, 1872:559. Type locality: Sikkim, India, described from a ♂ and a ♀.

External facies. 1. Eyespot between M_2 and M_3 on underside of hindwing only slightly elongate as compared with those on either side of it. 2. Marginal green lunules on underside of hindwing crescentic in shape with an orange spot separating them from the blue marginal spot at the outer angle. 3. Forewing below bearing five or six black spots between Cu_2 and 2dA.

Male genitalia (Figs. 1 & 2). 1. Aedeagus short and thick. 2. Saccus very short and narrow. 3. Valve bear-

[1]Most of the material examined is in the collection of the U.S. National Museum and is under the care of Mr. William D. Field, who was kind enough to let me make full use of it.

[2]Fruhstorfer, H. 1912. *In* Seitz, The Macrolepidoptera of the World, 9:533.

ing a single caudal prong. 4. Uncus flanked by two well developed prongs.

Distribution. This species is recorded from Sikkim and Bhutan by Fruhstorfer, *loc. cit.*, and I have seen a male from Assam (U.S. National Museum Collection).

Symbrentia silana de Niceville

Figs. 3-4

Symbrenthia silana de Niceville, 1885. J. Asiatic Soc. Bengal 54:117. Type locality: Buxa, Bhutan, and Sikkim, India, described from a male and female.

External facies. 1. Eyespot between M_2 and M_3 on underside of hindwing very elongate as compared with those on either side of it. 2. Marginal green lunules on underside of hindwing chevron shaped and continuous with the marginal spot at the outer angle. 3. Forewing below bearing three or four black spots between Cu_2 and 2dA.

Male genitalia (Figs. 3 & 4). 1. Aedeagus long and

Fig. 1. Male genitalia of *Symbrenthia niphanda* Moore with the aedeagus and left valve removed. The locality from which this specimen came is unknown. Fig. 2. Aedeagus of the genitalia in Fig. 1. Fig. 3. Male genitalia of *Symbrenthia silana* de Niceville with the aedeagus and left valve removed. This specimen was collected at Sivoke, Sikkim. Fig. 4. Aedeagus of the genitalia in Fig. 3. All views are of the lateral aspect at 45x. Both specimens are in the collection of the U.S. National Museum.

tapering. 2. Saccus moderately long and thick. 3. Valve bearing a caudal and a darsal prong. 4. Uncus flanked by two poorly developed prongs.

Distribution. This species is only known from Sikkim and Bhutan.

Drosophilid and Chloropid flies bred from Skunk Cabbage. — During May and June, 1956, I collected a great many rotting spathes of skunk cabbage, *Symplocarpus foetidus* L. (Nutt.) from a shady red maple swamp in Lexington, Massachusetts. These were placed in a cloth-covered jar, and from 10-20 days later, a succession of small Diptera emerged. The first flies were small psychodids, still undetermined. Two days later, several *Drosophila quinaria* Loew adults appeared, plus a single small damaged *Drosophila,* possibly *D. transversa* or near. Following the first drosophilids by 2-3 days were numerous chloropid adults: about 100 *Elachiptera costata* (Loew) and 2 each of *E. nigriceps* (Loew) and *E. erythropleura* Sabrosky, as well as two specimens of *Tricimba lineella* (Fall.). *Drosophila* was also reared later from rotting skunk cabbage leaf petioles that were macerated and left exposed for a week in the same swamp during June; the emergents were all or nearly all *D. quinaria,* and this species was also collected resting on skunk cabbage leaves at the same locality. *D. quinaria* does not come to baits of watermelon and other rotting fruits placed in the swamp, though numerous other *Drosophila* and *Chymomyza* were attracted in this way. I owe the determinations to Dr. Curtis W. Sabrosky, Dr. A. H. Sturtevant, and Dr. Marshall R. Wheeler. — W. L. Brown, Jr., Museum of Comparative Zoology, Harvard University.

THE GENUS *MESENTOTOMA* (COLLEMBOLA: ENTOMOBRYIDAE)

By Kenneth A. Christiansen

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In 1942 Salmon described a new genus and species of littoral Collembola under the name of *Mesentotoma exalga.* As he pointed out, these animals had a number of peculiar characteristics, not the least of which was the littoral habitat. Two species previously described as members of the genus *Entomobrya* also display many of these peculiar characteristics, including the littoral habitat. These are *E. laguna* Bacon and *E. dollfusi* Denis, and both are clearly separated from the remainder of the members of *Entomobrya.* Of the three species mentioned above, *dollfusi* is most similar to the members of the genus *Entomobrya,* and *laguna* is least so. In text-figure one below, it can be seen that the three species give the appearance of steps in a linear series of species, becoming more differentiated from the typical *Entomobrya* body structure. The differences between *dollfusi* and the typical *Entomobrya* species is so great that it is difficult to tell to what group of the genus it is allied. The most likely candidate appears to be the *E. marginata* group, and if we accept this hypothesis, then the idea of a linear relationship among the species is considerably reinforced by the structure of the male genital plate and the empodial appendage. While the basal position of *dollfusi* is fairly clear, some specializations of *exalga* would tend to indicate that it is not directly ancestral to *laguna,* although much less differentiated from the members of the genus *Entomobrya.* In the remainder of this paper the genus is redefined, and the three species belonging to it are described and figured. Although the unusual habitat makes this animal difficult to find, eventually more species will probably be turned

up, and these may serve to fill out some of the blank spots in the phylogeny of the group.

Genus *Mesentotoma* Salmon

Mesentotoma Salmon, 1942. Records of Dominion Museum, 1: 58,59.

Body form oval to elliptical, circular in cross section. *Antennae.* Lengths of segments variable, commonly 1-2. 5-2.5-3. Second segment with a more or less definite indication of basal subsegmentation. Apical bulb of fourth antennal segment present or lacking. *Head* oval, only slightly longer than broad. Labral papillae lacking setae. Labial appendage with a well developed differentiated external seta. *Legs* with all setae ciliate except for normal apical internal smooth setae on third pair of legs. Tenent hair clavate or acuminate. Empodial appendage quadrilammelate, widened for basal one-half to one-third of length and sharply acuminate for apical remainder. Internal distal edge often excavate. Unguis with from two to four internal teeth. The basal pair enlarged, often basally joined. Internal teeth large, basal in position and usually heavily reinforced. External teeth small or wanting. *Mucro* lacking basal spine, with small anteapical and large apical teeth.

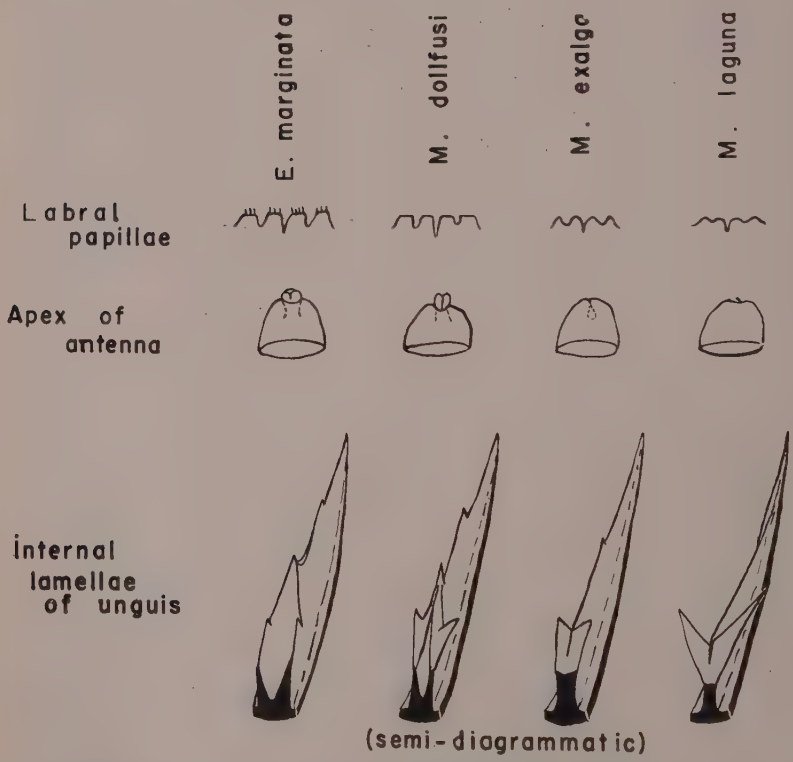
Mesentotoma exalga Salmon

Figs. 8-10

Mesentotoma exalga Salmon, 1942. Records of Dominion Museum, 1: 58,59.

Color and pattern. Background color yellow, pigment blue as follows: all of antennal segments two, three, and four; basal and apical rings on antennal segment one, plus ventral surface of this segment; ring around each antennal base and a connecting band. Small irregular spots over surface of head and a V-shaped mark in mid-region. Thoracic segment three through abdominal segment three largely blue except for scattered small pale spots and pale regions along the posterior edges of dorsum of abdominal segments one and two. Anterior and posterior margins of abdominal segment four with large oval dark areas. Anterior margin of fifth and all of sixth segment dark. Distal part of legs slightly darkened, remainder

of body pale. *Head.* Labial appendage with external differentiated seta slender, acuminate, reaching only two-thirds of the distance from base of seta to apex of same papilla. Labral papillae rounded. Fourth segment with apical pit, but no retractile bulb. *Legs.* Smooth setae on third pair of legs slightly curved. Tenent hair with clavate tip very flat and thin. Unguis with three or four internal teeth, basal pair large, remainder small to minute. Lateral teeth very large, basal in position and reinforced by heavy ridges. Empodial appendage triangular, strongly



Text-figure 1. Representation of the condition of various organs in the species of *Mesentotoma* and in *Entomobrya marginata.*

excavate along inner distal surface. *Dens and mucro.* Dens basally with a number of short heavy ciliate setae, blunted apically. Mucro typical of genus. *Clothing* generally as in genus *Entomobrya.* Large flexed clavate setae with expanded apex unusually large and projecting. Small common setae covered with short cilia along one side.

Discussion: The "bow-like lamella" mentioned by Salmon requires further study before its taxonomic importance can be evaluated. I have found structures similar, if not identical, to it in many species of *Entomobrya,* but present in only a few specimens of large series. The short knob-like projections on the venter of the manubrium are clearly seen in the one specimen examined; however, the possibility of their being artifact, combined with the complete lack of homologous structures in the Collembola, has caused me to leave them out of the description until further series are available for examination.

Distribution: *New Zealand*: Island Bay, Lyall Bay, Wellington (from bundles of seaweed).

Mesentotoma dollfussi (Denis) (New Combination)
Figs. 1-7

Entomobrya dollfussi Denis, 1924. Ann. Soc. Ent. Fr., 93: 232.
Entomobrya nigrina Womersley, 1928. Ann. Mag. Nat. Hist., (10) 2: 63.
Entomobrya atrata Womersley, 1929. Ann. Mag. Nat. Hist., (10) 4: 304.

Color and pattern. Background color white to yellow, pigment blue to purple. Second and third antennal segments apically darkened. Remainder of body with irregular pigmented bands and spots (see figures). *Head* slightly longer than broad. Labial appendage with external differentiated seta almost attaining level of apex of same papilla. Labral papillae truncate. Antennae with apical bulb of fourth segment bilobed, in a deep apical pit. Sense organ of third segment with two angled blunt thick setae, one conical guard seta. Second segment with two similar blunt setae more widely separated than those on third segment. Second segment with definite basal subsegment,

weakly demarcated. *Legs.* Tenent hair well developed, with normal clavate apex. Empodial appendage strikingly truncate, with one inner lamella excavate apically. Unguis with normal four internal teeth, basal pair partially joined by an incomplete lamella. *Mucro and genital plate.* Mucro typical of genus. Male genital plate of twelve smooth setae. Basal seta pair flattened, blade-like, remainder slender, acuminate. *Clothing.* Small underlying setae conical and unilaterally ciliate, with short ciliations.

Discussion: There is considerable variation in the pattern of this species, as is shown by the figures; however, this is less striking than in many species of the genus *Entomobrya.* The external differentiated seta of the labial appendage may reach the apex of the same papilla. The truncate nature of the labral papillae is not always clear. The species has been taken from Southern France, England, and North Africa, but may be widely distributed and uncollected elsewhere.

Distribution: *England*: Lundy Island; *France*: Greve de Vert, St. Jean Doigt; *North Africa*: Oued Ykem.

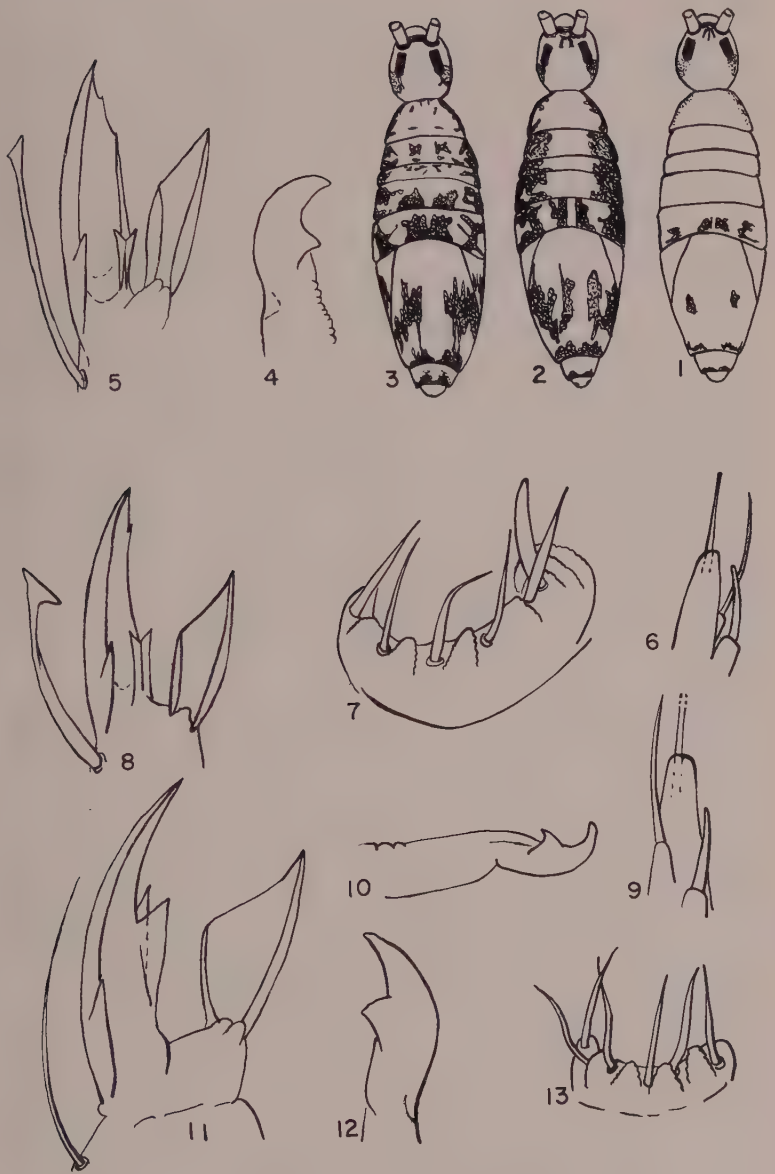
Mesentotoma laguna (Bacon)
(New Combination)
Figs. 11-13

Entomobrya laguna Bacon, 1913. Jour. Ent. Zool. Claremont, Calif., **5**:202-204. Bonet, 1934. Eos, **9**:157. Essig, 1942. College Entomology, 83. Gisin, 1944. Verh. Naturf. Ges. Basel, **55**:71.

Color and pattern. Pigment gray-brown to gray-blue except for appendages which are always blue. Pigment generally distributed over body, except for mid-region of venter. Many small pale spots scattered over body.

Explanation of Plate 1

Characteristic structures of the genus *Mesentotoma.* Figures 1-7 of *M. dollfusi*: 1-3, various patterns from France; 4, left mucro; 5, hind unguis and empodial appendage; 6, external setae of labial appendage; 7, half of male genital plate (basal seta to right). Figures 8-10 of *M. exalga*: 8, hind unguis and empodial appendage; 9, external setae of labial appendage; 10, right mucro. Figures 11-13 of *M. laguna*: 11, hind unguis and empodial appendage; 12, right mucro; 13, half of male genital plate (basal seta to right). All figures greatly enlarged.



CHRISTIANSEN — MESENTOTOMA

Head with a double V-shaped pale mark running from the posterior corner of each eye to the mid-posterior head region. Irregular pale areas occur on the dorsum of the fourth segment, and all intersegmental membranes are pale. *Antennae.* Apex of fourth segment with four or five flat knobs. Largest setae of antennae clubbed and ciliate, similar to but shorter than clubbed setae of body. Second antennal segment with distinct subsegment or partial suture. *Head.* Labial appendage with external differentiated seta contracted only at apex. Apex not reaching apex of same papilla, and slightly wider than normal setae. *Clothing.* Large flexed clavate setae unusually long (longest longer than antennae), with expanded tip produced into a slender filament.

Discussion: Only a few specimens were seen. The most striking variation concerns the color which varies from gray-blue to pale brown. The subsegment of the second antennal segment may be incomplete but at least part of the dividing suture is clearly visible in each case. The knobs at the apex of the fourth antennal segment may be very small or indistinct. Bacon illustrates an external tooth on the empodial appendage but this was not visible on any specimen in the series here examined.

Distribution: California: Palos Verdes (under submerged rocks) Laguna Beach (lower tidal zone, under rocks).

Acknowledgements

I wish to express my gratitude for the loan of material from the Dominion Museum of Wellington, New Zealand, and the private collections of Dr. Denis and Dr. Delamare Deboutteville of France. It was only the availability of this material which made this study possible.

FEEDING BEHAVIOR IN THE ANT *RHOPALOTHRIX BIROI* SZABÓ

By Edward O. Wilson
Biological Laboratories, Harvard University

Through recent work on the biology of the tribe Dacetini[1], it is now known that the members of this large, cosmopolitan group are generally predators which feed primarily on collembolans and secondarily on other soft-bodied arthropods. Most are slow-moving and rely on stealth and the trap-like action of their mandibles in securing their prey. It has been an open question whether other groups of ants morphologically convergent to the dacetines, such as the tribe Basicerotini and genera *Myrmoteras* and *Stegomyrmex,* show similar feeding behavior. Exclusively tropical distributions, scarceness, and small colony size have made the study of living material in these groups prohibitively difficult in the past. I was fortunate, therefore, during a recent visit to New Guinea to be able to find and study in life the basicerotine species *Rhopalothrix biroi.*

This species was encountered in lowland rainforest in the vicinity of the lower Busu River, near Lae. Here it is relatively common, turning up regularly in soil-litter berlesates and as strays under rotting logs on the ground. As in other *Rhopalothrix* species I have collected, colonies were exceedingly difficult to locate. I found only one (my accession no. 987), occupying indistinct chambers about a quarter-inch below the surface in loose soil under a rotting log. The colony was uncovered and partly scattered by random scraping of the soil surface in search for other ants. Thirty-four workers, two males, and a quantity of pupae and all stages of larvae were retrieved. Colony cohesion was good, and there was no trouble in

[1]See Brown, W. L., 1953, Ann. Ent. Soc. Amer., *46*: 465-471; and Wilson, E. O., *op. cit*: 479-495.

getting the ants to move into the brood chambers of a small plaster-of-paris Janet nest. The workers had soon massed the brood and were back out foraging in the food chamber.

During the next several days the following small animals were introduced alive into the food chamber: nematodes (possibly confused with small enchytraeid annelids), mites, spiders, isopods, millipedes, symphylans, entomobryid and onychiurid collembolans, campodeids, homopteran and heteropteran nymphs, fly larvae, beetle larvae and adults, and an adult minor worker of the ant genus *Pheidole*. The *Rhopalothrix* showed definitely neutral or aversive behavior toward the isopods, millipedes, onychiurid collembolans, beetle adults, and *Pheidole*. The nematodes, mites, and homopteran nymphs were completely overlooked or at least no definite reaction was recorded. One worker seized a cyclorrhaphan fly larva but was not able to subdue it. The remaining prey offered — spiders, symphylans, entomobryid collembolans, campodeids, and heteropteran nymphs — were captured and then eaten by the workers or larvae or both. Of this last group, entomobryids were the most quickly captured, and this could be explained on the basis of their relatively small size and feeble strength. My observations are too limited to establish prey specificity within the accepted group, but I believe that entomobryids may have formed the principal dietary staple of the colony in nature, since these insects were far and away the most abundant and accessible arthropods in the vicinity of the nest. Otherwise, if any generalization is to be made about food preference, it is probably safest to say that this species of *Rhopalothrix* accepts a wide variety of soft-bodied arthropods and rejects other animals that are either hard-bodied or possess repugnant odors.

Hunting behavior of the observation colony was very similar to that we have seen in the short-mandibulate dacetines. The workers foraged with the same slow, deliberate gait, but in addition punctuated by little total halts in the movement, one to three a second, making them appear to jerk along. On contacting potential prey

the ants "froze" in their movement, drew their antennae part way back (but not all the way against the head), and opened their mandibles maximally, that is, to the extent where the tips were about as far apart as the width of the clypeus. This was followed by a slow, cautious movement toward the prey. On one occasion a worker was seen to lunge and snap at an entomobryid immediately upon making contact, but careful stalking is probably the rule, as it is in the short-mandibulate dacetines.

Prey were carried into the brood chamber directly after capture; only once was a worker seen to feed on an entomobryid at the spot of capture. Captured animals were either left on the brood chamber apart from the larvae, or else placed immediately among the larvae, which fed on it directly, ponerine fashion. The adults fed separately or simultaneously with the larvae on the same animal, as I have observed many times in the dacetine genus *Smithistruma*.

While they behaved in an alert, aggressive manner toward potential prey, the *Rhopalothrix* reacted toward potential enemies, such as larger staphylinid beetles, by lowering the head, retracting the antennae entirely, and keeping the mandibles closed. One worker, knocked over by a beetle walking past, was seen to draw in all of its appendages and feign death.

The workers were very solicitous of the brood, washing it and moving it about constantly. They were in fact more attentive in this way than any dacetine genera I have studied. Adult oral trophallaxis was observed twice; the workers faced one another and twisted their heads slightly sidewise to approximate mouthparts. The adults also licked one another's bodies constantly. Once I saw a worker standing rigidly still, while a second worker curled around its upraised head and gave the mouthparts, gula, and prosternum a thorough washing. Adult transport was observed once. The transporter gripped the transportee's pedicel from below, while the transportee folded in its appendages pupal fashion. Later the transporter shifted its grip so that one mandible rested on the gaster.

A NEW SOUTHWESTERN SPECIES OF *MALLOTA* MEIGEN (DIPTERA: SYRPHIDAE)[1]

By Frank Montgomery Hull

University of Mississippi

I wish to thank Dr. Darlington and Dr. Bequaert for the opportunity to study the Syrphid material of the Museum of Comparative Zoology. This new species is in the Museum collections.

Mallota bequaerti, n. sp.

A large species characterized by dense yellow pile on mesonotum and scutellum. The abdomen is entirely short, densely black setate, with the exception of the fourth segment which is short, golden red, appressed setate. This species is very distinct from other forms, including *facialis* Hunter, var. *flavoterminata* Jones, because of the presence of the large, distinct, subquadrate, dark brown spots on the middle of the wing and the presence of the rather widely separated eyes of the male. Length, about 16 mm.

Male. *Head*: eyes bare, the vertex is convex and shining black with black pile; the ocelli lie in an equilateral triangle. The lateral margins of the vertical triangle, anterior and lateral to the ocelli, are striate. The eyes are separated by a distance at least equal to the space between the posterior ocelli. The front is shining black broadly down the middle and in front of the antennae, with the sides rather thickly dusted with pale yellowish pollen, which becomes more brownish medially; this leaves approximately the middle two-thirds of the front shining and bare, with the ground color black. The face is black, with a broad, shining, bare, medial stripe, its sides widely, silvery white micropubescent; pile of the face and front

[1]Published with a grant from the Museum of Comparative Zoology at Harvard College.

white. In profile the face is distinctly concave above the low tubercle; the cheeks are shining black. The first two segments of the antennae are black; the third segment distinctly wider than long and evenly rounded apically, a uniformly dark reddish brown color; the arista thickened, bare and entirely light brownish-yellow. Occiput black, densely covered with silvery pollen along the middle and below; this pollen begins near the upper third of the eye; the pile of the occiput is yellowish throughout, including long, dense, yellow pile immediately behind the vertex.

Thorax: the mesonotum is black, but is densely covered with light ochreous yellow pollen and thick, long, dense opaque, yellow pile, including the humeri and throughout the entire dorsum. The scutellum is subtranslucent ochreous yellow and covered with the same sulfur yellow pile; pleura black with thick, opaque yellow pile on upper portion of the mesopleura, which becomes sparse and scattered and less conspicuous on the ventral portion of the mesopleura and on the anterior and upper portion of the sternopleura. The pile on the posterior corner of the sternopleura and all of the pile of the pteropleura is black. Squamae subtranslucent brownish white; fringe brownish yellow; halteres yellow with dark brown knob.

Legs: all of the femora black or nearly so; in some lights the hind femora, towards the base, appear to be dark reddish sepia; the anterior and middle tibiae are nearly black, becoming more faintly dark brown near the base and apex; hind tibiae similarly colored, markedly flattened apically and distinctly arcuate. The pile of the femora and of the tibiae black, except along the anterior surface of the anterior tibiae, where the pile is yellow and there are a few yellow hairs along its posterior surface. All of the tarsi brown with black pile dorsally.

Wings: hyaline, with a strong, rather distinctly delimited, large, subquadrate, sepia brown cloud situated in the middle of the wing; this spot encloses and covers the anterior margin, the whole basal half of the first posterior cell; the apical half of the first basal cell; the upper basal corner of the third posterior cell; the apex of the second

basal cell and narrowly the posterior margin of the second basal cell. The costal cell is entirely pale brown, becoming darker towards the apex.

Abdomen: of the usual shape, except that it is perhaps somewhat more tapered posteriorly; it is quite broad basally and distinctly wider than the thorax and begins to rapidly narrow from the base of the second segment so that the shape is that of a short wedge-shaped triangle. The first, second and third segments are black or nearly so; in some lights close scrutiny suggests that the second segment and the third segment have a slight appearance of dark reddish sepia, which is almost black in color. The fourth segment is blackish basally, but becomes very dark mahogany reddish posteriorly; this is especially apparent when this segment is viewed from the rear; actually the fourth segment is also very dark and might be called black. The pile of the abdomen is dense, short, subappressed and black, but longer on the sides of the first and second segments; on the fourth segment it is appressed, short, abundant and golden reddish in color. The lateral pile along the extreme margin of the third segment is also golden. Hypopygium dark reddish brown with golden pile.

Holotype: male, Chisos Mts., Big Bend National Park, Texas; collected by J. Bequaert. I take pleasure in naming this handsome species in honor of its collector.

NYMPHALIS VAU-ALBUM (SCHIFFERMULLER & DENIS), A HOLARCTIC SPECIES (LEPIDOPTERA: NYMPHALIDAE)[1]

By Nicholas W. Gillham
Biological Laboratories, Harvard University

The purpose of this paper is to show that *Nymphalis j-album* (Boisduval), long considered a distinct species by North American workers, really represents the Nearctic populations of a Holarctic species correctly designated as *Nymphalis vau-album* (Schiffermuller and Denis).

Nymphalis vau-album (Schiffermuller & Denis)

Papilio vau-album Schiffermuller & Denis, 1775. Ankündung syst. werkes schmetterlinge Wiener gegend, p. 176; sex not specified. Type locality: "Wiener gegend".

Papilio N.[*ymphalis*] *Ph.*[*aleratus*] *L album* Esper, 1781. Die schmetterlinge in abbildungen nach der natur beschreibungen, 1 (Bd. 2): 69, pl. 62, contin. 12, figs. 3a & 3b; sex not specified. Type locality: Hungary and Austria.

V[*anessa*] *j-album* Boisduval & Leconte, 1833. Histoire général et iconographie Lépidoptères Amérique septentrionale, 1:185, pl. 50, figs. 1 & 2; sex not specified. Type locality: environs of New York, Philadelphia, and New Harmony, Indiana. New Synonymy.

Vanessa pocahontas Scudder, 1889. The butterflies of the eastern United States and Canada with special reference to New England, 1:379; proposed in synonymy without description, sex not specified.

Vanessa L. album samurai Fruhstorfer, 1907. Societas Entomologica, 22:60; 2♀♀, & 4♂♂. Type locality: Hondo, Japan. New Synonymy.

Aglais j-album watsoni Hall, 1924. Jour. N. Y. Ent. Soc.,

[1]Published with a grant from the Museum of Comparative Zoology at Harvard College.

32:109; holotype ♂+5♂♂ & 3♀♀. Type locality: Sicamous, B. C., Canada. NEW SYNONYMY.

The name *vau-album* was proposed, together with several other names, in one very limited description by Schiffermuller and Denis in 1775. In addition, there are no figures of the species given and this name could easily be considered a *nomen nudum* as Stichel (1909) has done. However, most of the other names in this volume were proposed in a similar vague fashion and many are presently in general use. Therefore, I have followed the example of Grey, Klots, and dos Passos (1952), as regards this publication, and am considering *vau-album* as validly proposed. Because of this, *L-album* Esper, 1781, falls as a direct synonym of *vau-album* on the basis of priority.

The names *j-album* Boisduval, *watsoni* Hall, and *samurai* Fruhstorfer are synonymized. *J-album* and *watsoni* are the names applied to North American populations of *vau-album*. They differ from the Palearctic populations in that they average slightly smaller[2] and are more lightly marked along the outer margin of the upperside of the hindwing. These differences are very weak, however, and would probably break down completely when material covering the whole range of the species becomes available. In addition, a comparision of the male genitalia of specimens from the two areas failed to reveal any differences that were not attributable to individual variation.

The name *samurai* applies to populations from the easternmost portions of the Palearctic. This subspecies is supposed to be distinguished from nominotypical *vau-album* by the following characters: ♂♂ with richer black designs above and a distinct white band on the underside of the hing wing, ♀♀ more darkly marked below and along the basal edge of the hindwing above. These

[2]The measurement used as an index of relative size was the length of the costa from base to apex as measured with a vernier caliper. Measurements are given to the nearest millimeter and are as follows: Palearctic populations, ♂♂ N = 12, Mean = 31 mm., Range = 27-33 mm.; ♀♀ N = 4, Mean = 32 mm., Range = 30-33 mm.; Nearctic population, ♂♂ N = 19, Mean = 32 mm., Range = 31-55 mm.; ♀♀ N = 16, Mean = 33 mm., Range = 30-37 mm.

distinctions are very minor and do not hold up when series are examined.

In the Old World this species ranges from southeastern Europe eastwards across Asia to Kamtchatka, Korea, and Japan. From there it ranges south to Assam and Kashmir. It is found over most of North America from Alaska and Labrador south to West Virginia and Utah (Gertsch, *pers. commun.*).

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Stichel, H.

1909. Genus *Polygonia* Hon. *In* Seitz, A., The Macrolepidoptera of the World, Stuttgart. 1 (the Palearctic Butterflies):206-207.

TWO NEW SPECIES OF *EMELINUS* FROM ARIZONA (COLEOPTERA: ADERIDAE)[1]

By FLOYD G. WERNER

University of Arizona, Tucson, Arizona

The two species of *Emelinus* described here bring the known species in our fauna to four. Others assignable to the genus have been described from Central and South America but, so far, none from the Old World. Since the last general work on Nearctic species of Aderidae, by Casey in 1895,[2] there has been only one significant publication affecting our fauna, a reclassification on a World basis by Baguena Corella in 1948.[3] Whereas neither Pic nor Champion felt that the genera set up by Casey could have more than subgeneric or species-group significance, Baguena Corella has made an effort to split up the huge and diversified assemblage of species already assigned to *Xylophilus* or *Hylophilus,* raising *Emelinus* not only back to generic rank but setting it off in a separate tribe, Emelinini. Baguena Corella also shows good reason for using the family name Aderidae, thus ending a triple tie for the names Euglenidae, Xylophilidae and Hylophilidae.

Baguena Corella's definition of *Emelinus* restricts it to species with the head totally visible from above and with the male antennae flabellate from the fourth segment. The two new species fit this diagnosis but differ in some details possibly of generic significance from *E. melsheimeri* (Lec.) and *E. ashmeadi* Csy. In these the antennae angle beyond the third segment in the male and the rami of segments six through ten originate near the apex of the segments. The two species from Arizona do

[1]Published with a grant from the Museum of Comparative Zoology at Harvard College.

[2]Ann. N. Y. Acad. Sci. *8*:772-809.

[3]"Estudio sobre los Aderidae," Instituto de Estudios Africanos, Madrid.

not have the antennal angling and the rami all originate before or near the middle of the segments. Casey noted the angling in *E. ashmeadi* but it was not mentioned by Champion in the Central American species, nor does it appear in his figures. It seems most likely that the two Arizona species are more closely related to those described from Central America than they are to *melsheimeri* and *ashmeadi*, the two species from which a genotype must be selected.

Both the species described below were collected by the author, in company with Dr. George D. Butler, Jr., in Ramsey Canyon, Huachuca Mts., *huachucanus* mostly below the "box" and *butleri* entirely about one-half mile above the "box." The presence of both species was detected by random sweeping of vegetation alongside the path. In each case additional specimens were obtained by more intensive sweeping and examination where the first specimens were taken. All the *butleri* specimens came from an area less than twenty feet across and mostly from maple leaves. Almost all the *huachucanus* came from a similar area, from leaves of a broad-leaved oak. Since both trees are widely distributed in the canyon, it seems likely that the small areas of abundance were in some way tied in with emergence of the adults from a very restricted habitat. Undisturbed individuals of both species appeared simply to be resting on the upper surfaces of the leaves; there was no sign of feeding of any kind.

Key to the Nearctic Species: Males

1. Antennae angled backward at apex of segment III; rami of antennal segments VI-X arising near apex of segments, of such lengths that the rami and segment XI form an almost evenly rounded series across their ends. Elytra with a variegated pattern of darker markings ..... 2.

   Antennae not angled at apex of segment III; all rami arising before middle of segments, almost uniform in length, not making a rounded series across their ends ..... 3.

2. Eyes almost contiguous in front .... *E. ashmeadi* Csy.
   Eyes separated in front by 2/5 their maximum width ..... *E. melsheimeri* (Lec.)
3. Rami all less than 1/5 the total length of the antenna. Elytra brown, with a variegated paler pattern .... *E. huachucanus* sp.n.
   Some of the rami almost 2/5 total length of antenna. Elytra very dark brown, marked with reddish at the humeri ..... *E. butleri* sp.n.

I have before me a single male of *melsheimeri* I collected in LaSalle Co., Illinois, June 29, 1938, and compared several years ago with the type in the LeConte collection. A male of *ashmeadi* collected at Gainesville, Florida, March 4, 1947, by H. V. Weems, Jr., has been loaned by Mr. C. A. Frost. What I take to be the female of this species is before me from Fairfax Co., Virginia, collected in June, 1923, by Mr. Quirsfeld, on loan from the Cornell collection.

It seems inadvisable to attempt a key to the females at this time, there being little to compare them with in other genera. The peculiar structure and pubescence at the base of the pronotum, as described under *butleri*, may be diagnostic of the genus. The female of *ashmeadi* has antennal segment II very sharply, obliquely truncate at base. In females of *butleri* and *huachucanus* segment II is simple. What appears to be still another undescribed species is represented by a single female from Sta. Rita Mts., Arizona, July 30, 1938, collected by D. J. & J. N. Knull. This is in most respects like the female of *huachucanus* but has the elytra pale and has the eyes more deeply emarginate than the female of that species. The emargination is almost ogival rather than rounded, as it is in *huachucanus* and *butleri*. This specimen is being returned to the collection of the Ohio State University.

Emelinus butleri sp.n

Very dark brown, the humeri of the elytra broadly rufous. Bases of legs pale. Sparsely and quite evenly clothed with short cinereous pubescence. Rami of male antennae short, all less than 2/5 as long as antenna and

quite even in length, only just perceptibly thickened apically.

Holotype male: Length (based on length of head to front margin of eyes, plus length of pronotum and length of elytra) 3.65 mm.; maximum width of elytra ca. 1.1 mm. Antennae 2.10 mm., 0.57 as long as the body. Head suborbicular, deeply and evenly punctured, with moderately sparse, decumbent, cinerous pubescence. Length, to bottom margin of eyes, 0.56 mm.; width across eyes, 0.73 mm. Fronto-clypeal suture deep; clypeus and labrum more finely and sparsely punctured and pubescent than the rest of the head. Eyes deeply excavated for the antennae, 0.42×0.33 mm., separated from each other by 0.09 mm. A smooth border surrounds the eyes, somewhat widened behind. Last segment of maxillary palpi securiform, 0.24×0.14 mm. Last segment of the labial palpi, as in all the species treated here, oval and with a conspicuous membranous sensory area beneath.

Antennae very dark brown, with sparse, suberect pubescence. Segment I is barrel-shaped; II short and stout, the dorsal the shortest side; III subcylindrical, slightly expanded at the apex; IV-X with dorsal rami, curved slightly toward the apex of the antenna, and slight ridges anteriorly near the apices. The ramus of IV originates near the base, of X just beyond the middle of the segment and there is a gradual transition in between. Segment XI has a knob 0.63 of the distance from the base, this knob most prominent posteriorly. Measurements (in relation to a total length of 1,000 units, from segment I to XI, length/thickness): 99/46, 37/41, 109/37, 92/25, 86/25, 86/25, 86/25, 86/25, 86/22, 86/22, 236/55. Segment XI is slender at base, 23 units, gradually expanding to knob, 55, then abruptly contracting, with a short apical section 25 units wide. Rami (at same ratio) IV to X: 238, 308, 337, 326, 320, 295, 246. The individual rami are ca. 0.03 mm. wide at base, expanded feebly at apex to ca. 0.05 mm.

Pronotum subcampanulate, the effect accentuated by a tuft of several setae at the posterior angles. Length 0.65 mm., width 0.64 mm. Base slightly indented at middle,

the indention flanked by a pair of feeble elevations on the disc. The pubescence is peaked posterior to these elevations, leaving the slight median indentation free of setae. Surface shiny, densely and deeply punctured and sparsely, evenly pubescent, as on head. Scutellum truncate, densely punctured. Elytra almost parallel-sided, evenly, conjointly rounded behind, 2.44 mm. long, 0.87 mm. wide at humeri, ca. 1.1 mm. at widest. Basal 25%, except along suture, rufous. This zone is not sharply defined. Omoplate area slightly, conjointly elevated. Surface shiny, deeply punctured but not as densely as on pronotum, the middle of the punctures ca. 0.05 mm. apart. (On the disc of the pronotum they are ca. 0.03 mm. apart). All of the dorsal punctures have rounded bottoms. Pubescence correspondingly sparser, longer, about 0.09 mm. long, decumbent, all cinereous, not at all influenced by the ground color.

Underside dark brown, the coxae and trochanters, as well as the inner edge of the front and middle femora, paler. Suture between the first and second apparent abdominal sternites distinct all the way across. Posterior femora thickened beyond middle, ca. 2 times as thick as at base. First segment of the posterior tarsi 0.44 mm. long, the rest together 0.28; ratio of the first to the rest 1.54: 1.

Allotype female: differs from the male most notably in the absence of rami on the antennae, also in the size of the eyes. Segments IV-X are truncate basally and apically, as in the male, but there is no sign of any projections in the places where the rami occur in that sex. These segments are articulated anterior to the middle. The antennae are 1.66 mm. long, on a specimen 3.9 mm. in total length, or 0.43 the length of the body. The individual measurements (to a total length of 1,000 units) are: 129/61, 61/46, 109/42, 92/46, 84/46, 77/46, 77/48, 77/48, 77/48, 77/60, 138/77. It will be noted from these figures that segment XI is of more normal proportions than in the male, where XI appears, at first glance, to be just one more ramus on the flabellate antennae. The eyes are 0.44 mm. $\times$ 0.22 mm. and are separated by 0.22 mm. The posterior tarsi are

slightly shorter than in the male. Segment I is 0.38 mm. long, the rest together 0.20 mm., the ratio of I to the rest 1.94: 1.

Holotype male and allotype female: Ramsey Canyon, Huachuca Mts., Cochise Co., Arizona, July 12, 1955, F. G. Werner & G. D. Butler, deposited in the MCZ. 6 male and 1 female paratypes from the same locality, July 12 and 13, 1955, in the collections of the University of Arizona, the U.S. National Museum, California Academy of Sciences and the author. 1 male paratype Madera Canyon, Sta. Rita Mts., Arizona, July 31-Aug. 1, 1948, W. Nutting & F. Werner, in the collection of the author, and 1 female Mud Springs, Sta. Catalina Mts., Arizona, July 17-20, 1916, — 6,500′; being returned to Ohio State.

There is very little variation in the series, the length ranging from 3.3 mm. to 3.65 mm. in the males and 3.9 mm. to 4.3 mm. in the females. This species is named after Dr. George D. Butler, Jr., my collecting companion and colleague in the Department of Entomology.

Emelinus huachucanus sp.n.

Brown, the elytra paler in an obscure pattern as follows: an oblique zone on 2nd quarter of each elytron, approaching suture behind; a smaller zone at apical 3/4, transverse and extending approximately 1/3 across each elytron, narrowly and obscurely connected behind along suture to a small zone at apical 5th. Rami of male antennae short, almost uniform in length, all less than 1/5 as long as the antenna. Only *E. breviramus* (Champ.) approaches this condition and, if the illustration in the Biologia is correct, the longest ramus is 1/4 as long as the antenna in that species.

Holotype male: length 3.51 mm.; maximum width of elytra ca. 1.06 mm. Antennae 2.12 mm. long, 0.60 as long as the body. Head elliptical, 0.53 mm. long to front edge of eyes, 0.77 mm. wide across eyes. What little surface is not covered by the eyes is smooth, shiny, deeply and densely punctured, with moderately sparse, subdecumbent pubescence. Eyes very large, 0.50 × 0.42 mm., separated by only ca. 0.03 mm., deeply excised for the insertion of

the antennae. Fronto-clypeal suture strong; clypeus and labrum with finer and sparser punctures and pubescence than rest of head. Last segment of maxillary palpi 0.26 × 0.14 mm. Details of antennal segments almost exactly as in *butleri,* except that the rami are of different proportions. Measurements (to a total length of 1,000 units) : 73/49, 36/36, 115/35, 85/27, 85/24, 91/23, 85/23, 79/22, 85/27, 85/27, 182/42. Rami, from IV to X: 121, 176, 182, 188, 182, 176, 158. Individual rami noticeably thickened apically, from ca. 0.02 mm. at base to ca. 0.04 mm. at apex. These figures are similar to those of *butleri* but the shorter rami here accentuate the thickening. Segment XI is 24 units wide at base, gradually expanding to the knob, 42, at 0.6 of the way from the base, then constricts and tapers gradually to the apex. Pronotum very similar in detail to that of *butleri,* except that there is a pair of feeble impressions on the disc just anterior to the slight postero-median elevations, within the basal third. Details of scutellum and elytra likewise almost identical with *butleri,* except for the color pattern of the elytra. The punctures do not appear as distinct, because of the paler ground color. Pronotum 0.64 × 0.64 mm.; elytra 2.34 mm. long, 0.94 mm. wide at humeri, ca. 1.06 mm. at widest. Details of underside also much as in *butleri,* but thorax pale and legs, except coxae and tarsi, mainly dark. First segment of posterior tarsi 0.44 mm. long, rest together 0.30 mm.; ratio of I to rest 1.48: 1.

Allotype female: The remarks about the comparison of male and female under *butleri* apply equally well here. On a specimen 3.3 mm. long the antennae are 1.37 mm. long, or 0.40 as long as body. The individual measurements of the segments (to a total of 1,000 units) are: 130/56, 75/47, 112/43, 94/51, 79/54, 69/54, 75/54, 75/58, 75/65, 75/66, 140/82. The eyes are 0.37 × 0.31 mm. and are separated by 0.18 mm. The first segment of the posterior tarsi is 0.41 mm. long, the rest together 0.24 mm., giving a ratio of the first to the rest of 1.68: 1.

Holotype male and allotype female: Ramsey Canyon, Huachuca Mts., Cochise Co., Arizona, July 12, 1955, F. G.

Werner and G. D. Butler, deposited in the MCZ. 102 male and 19 female paratypes from the same locality, July 12 and 13, 1955, in the collections of the MCZ, University of Arizona, U.S. National Museum, California Academy of Sciences and the author. One female paratype collected in Huachuca Mts., Arizona, July 20, 1937, D. J. & J. N. Knull returned to Ohio State.

There is some variation in the extent of the pale markings on the elytra, these being reduced to not much more than dots in some and broadened so that they are very conspicuous in others. Total length ranges from 2.8 to 3.7 mm. in the males and from 3.1 mm. to 3.8 mm. in the females.

SOME SYNONYMIES IN THE ANT GENUS *CAMPONOTUS*

By William L. Brown, Jr.
Museum of Comparative Zoology, Harvard University

Ant specialists have long since "lost control" of the ants genus *Camponotus* Mayr. Somewhere between one and two thousand names of species, subspecies and varieties currently stand in the books, and the fifty or so subgeneric names in use are probably not all familiar to any single pair of myrmecological ears. Small samplings of different parts of the world fauna, and the few larger works like Creighton's book on the ants of North America, reveal that the taxonomy of the genus is in a very confused state. It appears that a great many, perhaps a majority, of the subspecies and varieties are straight synonyms, as are also a goodly percentage of the full species. Other varieties and subspecies are certainly good species in the biological sense, even though morphological differences separating them may be relatively weak in conventional terms. The job of revising *Camponotus* is probably too great for one man to attempt, even if any specialist were game enough to try, during a normal life span; there are just too many names to deal with. A piecemeal attack therefore seems to afford the best chance of reducing the genus to a reasonable number of species, a number small enough to attract revisers of the future. One class of synonymies especially should be published as soon as detected; I refer to the cases where types of two forms can be compared directly. At the Museum of Comparative Zoology, which now houses the largest and most complete collection of ants in existence, the constant accession of types by exchange, and examination of still others by loan, permits the certain detection of many obvious synonyms that would otherwise be very uncertainly identified from their descriptions. It seems wise to have such synonymies enter the published record as they are made, even if the record consists of short notes. If properly set up, such notes will be caught and listed, with their new synonymy, in the Zoological Record, and will thus become even more widely disseminated. Every certain

synonymy properly listed and justified is a further step toward the eventual fulfillment of a badly needed revision.

Camponotus acvapimensis Mayr

Camponotus acvapimensis Mayr, 1862, Verh. zool.-bot. Ges. Wien, 12: 664, worker minor. Type loc.: Akwapim Mts., Gold Coast.

Camponotus akwapimensis (!) var. *Poultoni* Forel, 1913, Rev. Zool. Afr., 2: 353, "female," *recte* worker. Type loc.: Lagos, Nigeria. NEW SYNONYMY.

Camponotus (*Myrmoturba*) *acvapimensis*, Wheeler, 1922, Bull. Amer. Mus. Nat. Hist., 45: 948, with var. *poultoni*, p. 949; synonymy and bibliography.

Camponotus (*Myrmopyromis*) *flavosetosus* Donisthorpe, 1945, Ann. Mag. Nat. Hist., (11)12: 271, soldier, worker. Type loc.: near Flabo Falls, 1200 feet, British Togoland. NEW SYNONYMY.

This is one of the common ants in many parts of Equatorial Africa. Variation at single localities, and even within colonies, extends to include Forel's var. *poultoni* as he described it. I have examined a worker paratype of *flavosetosus* and found it an average *acvapimensis* example.

Camponotus testaceipes (F. Smith)

Formica testaceipes F. Smith, 1858, Cat. Hym. Brit. Mus., 6: 39, worker. Type loc.: King George Sound, Western Australia.

Camponotus (*Myrmophyma*) *darlingtoni* Wheeler, October, 1934, Jour. R. Soc. W. Australia, 20: 160, workers max., med., min.; female. Type loc.: Margaret River, Western Australia; *nec C.* (*Myrmocladoecus*) *sanctaefidei darlingtoni* Wheeler, November (!), 1934. NEW SYNONYMY.

Camponotus (*Myrmophyma*) *rottnesti* Donisthorpe, 1941, Ent. Mon. Mag., 77: 239, *nom. pro C.* (*Myrmophyma*) *darlingtoni* Wheeler, 1934. NEW SYNONYMY.

Dr. E. O. Wilson has kindly compared types of *C. testaceipes* in the British Museum with syntypes of *C. darlingtoni* (Margaret River series) sent to him from the Museum of Comparative Zoology; he judges them to be of the same species. This situation was previously thought to hold, even though Wheeler reported upon specimens he identified as the true *C. testaceipes* in the same paper in

which he described *darlingtoni*. This species is quite variable in color in Western Australia, where it is a common inhabitant of the sand plains paralleling the coast from Geraldton around to the country east of Esperance.

Camponotus hartogi Forel

Camponotus Hartogi Forel, 1902, Rev. Suisse Zool., **10**: 500, worker. Type loc.: Yarra Districts, Victoria, Australia.

Camponotus (*Myrmosaga*) *ferruginipes* Crawley, 1922, Ent. Mon. Mag., (3) 8: 125, worker major. Type loc.: Healesville, Victoria. NEW SYNONYMY.

The types of Crawley's and Forel's species come from the same general area to the east of Melbourne, and there seems little doubt that both descriptions apply to the same common species of black *Camponotus* with red legs found in this area by many collectors, including myself. The species occurs in and around the cool, rainy highlands of Victoria, New South Wales and southeastern Queensland. It is abundant near the summit of Mt. Donna Buang (Brown) and on the Bogong High Plains (5600-6000 ft., F. E. Wilson leg.) in snow-gum and snow-grass woodland.

Camponotus whitei Wheeler

Camponotus (*Myrmosphincta*?) *whitei* Wheeler, 1915, Trans. R. Soc. S. Australia, **39**: 818, pl. 66, fig. 8, worker minor. Type loc.: Flat Rock Hole, Musgrave Ranges, S. Australia.

Camponotus (*Myrmosaulus*) *scutellus* Clark, 1930, Proc. R. Soc. Victoria, Melbourne, (n.s.) 42: 123, fig. 1, nos. 9, 10, workers maj., min. Type loc.: Tammin, W. Australia (by present selection). NEW SYNONYMY.

Types of *scutellus* (MCZ) compare well with a series of *whitei* determined by Wheeler, collected by A. M. Lea at Port Lincoln, South Australia. This curious little species ranges very widely in the arid and semiarid parts of the southern half of Australia. It is known from the Victorian mallee country (Sea Lake, leg. J. C. Goudie), from many parts of South and Western Australia, and from as far north as Alice Springs (Brown) in central Australia and Mullewa in Western Australia (W. M. Wheeler leg.).

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